

How does the feeding habits of elephants influence ground hornbills?

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Introduction

The African elephant (*Loxodonta africana*) has been described as an ecosystem engineer with the capacity to structurally modify the vegetation on which they feed. For certain tree nesting birds such as the Southern Ground hornbill (*Bucorvus leadbeateri*), elephants may be removing potential or existing nesting sites by felling large trees. Within the Associated Private Nature Reserves (APNR) on the western border of the Kruger National Park (KNP), all trees with active or potential ground hornbill nests were monitored for elephant impact and compared to trees without natural nesting sites but of similar species and size classes.

Results

An earlier study on the foraging behaviour of elephants found that the suite of tree species preferred and impacted by elephants differed from that favoured by ground hornbills as nesting sites. (Table 1: $\chi^2=128.1$, $df=15$, $P<0.0001$). On average, ground hornbills used smaller trees for nesting sites within the APNR ($n=24$, mean DBH= 81.0 cm, S.D = 31.6, range 42-200 cm) than those found by Kemp & Begg (1996) within the KNP ($n=39$, mean DBH= 119, S.D= 111, range 37-600 cm). Ground hornbills often used dead trees for nesting sites both within the APNR (29%) and the KNP (46%) although the proportion of dead trees used as nesting sites did not differ significantly between the two localities (Fisher's exact test).

Table 1: The frequency of individual trees within a species which were classified as having either active or potential ground hornbill nests within the APNR or KNP (Kemp & Begg 1996). Greyling (2004) recorded the number of individual trees within each species that was used by elephants along their foraging paths.

Species	APNR nesting trees	KNP nesting trees	APNR Use by elephants
<i>Combretum imberbe</i>	5	20	2
<i>Diospyros mespiliformis</i>	7	10	8
<i>Ficus sycomorus</i>	0	13	0
<i>Sclerocarya birrea</i>	4	10	14
Other	8	18	149

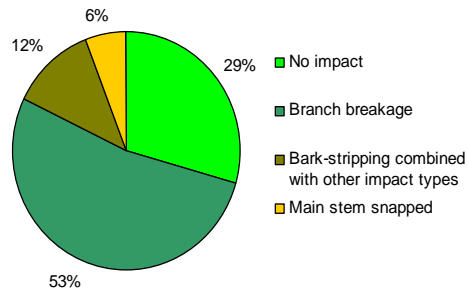


Figure 1: The proportion of different elephant impact types for trees with active and potential ground hornbill nests.

When comparing trees of similar species and size ($n=161$, DBH range 42-200) within the APNR, elephant impact types differed more than expected between trees with active or potential nests and trees without nests (Figure 1: $\chi^2=29.0$, $df=8$, $P=0.0003$). Ground hornbills appeared to select trees for nesting sites where elephant impact was less and where elephants had broken branches more frequently than bark-stripped the tree. Kemp & Begg (1996) found that half of all nest cavities were judged to have been formed by rotting back from where a branch had broken off. Consequently elephants and bulls in particular may play an important role in creating natural ground hornbill nests as bulls broke larger branches to access smaller plant parts than breeding herds ($t_{130} = 2.2$, $P=0.026$). The heights at which both bull groups and breeding units of elephants were found to brake large branches ($n=62$, 2.0 ± 0.20 m, SEM and $n=50$, 1.4 ± 0.11 m, SEM respectively), was within the range of the nest heights of ground hornbills for the APNR (mean 3.3 m, S.D. = 1.06, range 1.2-5.0) and the KNP (mean 4.6 m, S.D. = 1.8, range 1.2-8.5). When considering the severity of the impact type, trees with active or potential nests were less severely bark-stripped than trees without nests ($\chi^2=17.4$, $df=6$, $P=0.0078$). Trees with active or potential nests had branches removed by elephants to the same extent as trees without nests ($\chi^2=0.10$, $df=6$, $P=1.000$).

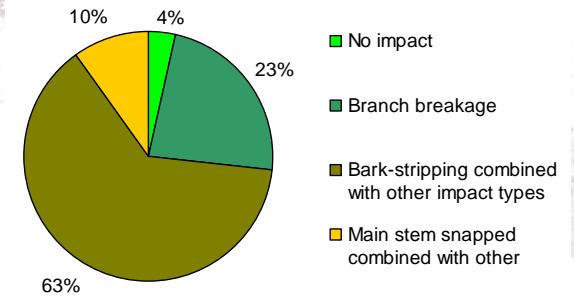


Figure 2: The proportion of different elephant impact types for trees without ground hornbill nests.

Conclusion:

Results indicate that the species of trees favoured by ground hornbills for nesting sites are at low risk of elephant impact. There is reason to believe that elephants, by breaking primary branches, actually play a facilitating role in the creation of nests in certain tree species. The impact of elephants on the nesting sites of raptors needs further investigation as most of these sites appear to be situated in *Acacia nigrescens* trees which are one of the favoured woody species of both elephant bulls and breeding groups.

References:

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Definitions:

Tree = a perennial woody plant with a single main stem and a distinct upper grown (Van Wyk & Van Wyk 1997). Single stemmed plants with basal measures > 6 cm were also used to distinguish trees from shrubs according to the guidelines given by Walker (1976).

Potential ground hornbill nest = nesting cavity identified by ground hornbill researchers (2001-2008) of suitable proportions in a tree that has not been occupied by ground hornbills but which is also situated at a suitable height for occupancy.